

ARTIFICIAL INTELLIGENCE AND PREVENTIVE PHYSIOTHERAPY: TECHNOLOGICAL STRATEGIES FOR QUALITY OF LIFE AND HEALTH PROMOTION

INTELIGÊNCIA ARTIFICIAL E FISIOTERAPIA PREVENTIVA: ESTRATÉGIAS TECNOLÓGICAS PARA QUALIDADE DE VIDA E PROMOÇÃO DA SAÚDE

INTELIGENCIA ARTIFICIAL Y FISIOTERAPIA PREVENTIVA: ESTRATEGIAS TECNOLÓGICAS PARA LA CALIDAD DE VIDA Y LA PROMOCIÓN DE LA SALUD



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ABSTRACT

Artificial intelligence has promoted significant transformations in health services, expanding the possibilities for prevention, monitoring and follow-up of individuals in different care contexts. Within the field of preventive physiotherapy, the incorporation of intelligent technologies has fostered the development of strategies aimed at the early identification of risk factors, continuous functional monitoring and the promotion of healthy habits, contributing to the improvement of quality of life and the strengthening of health promotion actions. The present study aimed to analyse the application of artificial intelligence in preventive physiotherapy, considering the use of technological strategies aimed at improving quality of life and strengthening health promotion actions in different clinical and preventive contexts. Methodologically, the research was characterised as qualitative and used a literature review as its investigative procedure. The analysis was grounded in 24 scientific sources, comprising books and articles published in specialised journals, selected according to their relevance for understanding the relationships between artificial intelligence, preventive physiotherapy, quality of life and health promotion. The results of this research demonstrated that artificial intelligence has contributed significantly to strengthening preventive physiotherapy through the use of technological strategies aimed at functional monitoring, human movement analysis, personalisation of interventions and continuous follow-up of individuals. It was found that these tools foster the prevention of dysfunctions, the improvement of functionality, health promotion and quality of life, in addition to expanding the possibilities for health education and the encouragement of healthy habits. It is concluded that the integration between artificial

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intelligence and preventive physiotherapy represents an important perspective for the development of more efficient, accessible and prevention-oriented care practices.

Keywords: Artificial Intelligence. Preventive Physiotherapy. Quality of Life. Health Promotion.

RESUMO

A inteligência artificial tem promovido transformações significativas nos serviços de saúde, ampliando as possibilidades de prevenção, monitoramento e acompanhamento dos indivíduos em diferentes contextos assistenciais. No âmbito da fisioterapia preventiva, a incorporação de tecnologias inteligentes tem favorecido o desenvolvimento de estratégias voltadas à identificação precoce de fatores de risco, ao acompanhamento funcional contínuo e à promoção de hábitos saudáveis, contribuindo para a melhoria da qualidade de vida e para o fortalecimento das ações de promoção da saúde. O presente estudo teve como objetivo analisar a aplicação da inteligência artificial na fisioterapia preventiva, considerando o uso de estratégias tecnológicas voltadas à melhoria da qualidade de vida e ao fortalecimento das ações de promoção da saúde em diferentes contextos clínicos e preventivos. Metodologicamente, a pesquisa caracterizou-se como qualitativa e utilizou a revisão bibliográfica como procedimento de investigação. A análise foi fundamentada em 24 fontes científicas, constituídas por livros e artigos publicados em periódicos especializados, selecionados em função de sua relevância para a compreensão das relações entre inteligência artificial, fisioterapia preventiva, qualidade de vida e promoção da saúde. Os resultados desta pesquisa evidenciaram que a inteligência artificial tem contribuído significativamente para o fortalecimento da fisioterapia preventiva por meio da utilização de estratégias tecnológicas voltadas ao monitoramento funcional, à análise do movimento humano, à personalização das intervenções e ao acompanhamento contínuo dos indivíduos. Constatou-se que essas ferramentas favorecem a prevenção de disfunções, a melhoria da funcionalidade, a promoção da saúde e a qualidade de vida, além de ampliarem as possibilidades de educação em saúde e incentivo à adoção de hábitos saudáveis. Conclui-se que a integração entre inteligência artificial e fisioterapia preventiva representa uma importante perspectiva para o desenvolvimento de práticas assistenciais mais eficientes, acessíveis e orientadas à prevenção.

Palavras-chave: Inteligência Artificial. Fisioterapia Preventiva. Qualidade de Vida. Promoção da Saúde.

RESUMEN

La inteligencia artificial ha promovido transformaciones significativas en los servicios de salud, ampliando las posibilidades de prevención, monitorización y seguimiento de los individuos en diferentes contextos asistenciales. En el ámbito de la fisioterapia preventiva, la incorporación de tecnologías inteligentes ha favorecido el desarrollo de estrategias orientadas a la identificación precoz de factores de riesgo, al seguimiento funcional continuo y a la promoción de hábitos saludables, contribuyendo a la mejora de la calidad de vida y al fortalecimiento de las acciones de promoción de la salud. El presente estudio tuvo como objetivo analizar la aplicación de la inteligencia artificial en la fisioterapia preventiva, considerando el uso de estrategias tecnológicas orientadas a la mejora de la calidad de vida y al fortalecimiento de las acciones de promoción de la salud en diferentes contextos clínicos y preventivos. Metodológicamente, la investigación se caracterizó como cualitativa y utilizó la revisión bibliográfica como procedimiento de investigación. El análisis se fundamentó en 24 fuentes científicas, constituidas por libros y artículos publicados en revistas especializadas, seleccionados en función de su relevancia para la comprensión de las relaciones entre inteligencia artificial, fisioterapia preventiva, calidad de vida y promoción de la salud. Los resultados de esta investigación evidenciaron que la inteligencia artificial ha

contribuido significativamente al fortalecimiento de la fisioterapia preventiva mediante la utilización de estrategias tecnológicas orientadas a la monitorización funcional, al análisis del movimiento humano, a la personalización de las intervenciones y al seguimiento continuo de los individuos. Se constató que estas herramientas favorecen la prevención de disfunciones, la mejora de la funcionalidad, la promoción de la salud y la calidad de vida, además de ampliar las posibilidades de educación en salud y de incentivo a la adopción de hábitos saludables. Se concluye que la integración entre inteligencia artificial y fisioterapia preventiva representa una importante perspectiva para el desarrollo de prácticas asistenciales más eficientes, accesibles y orientadas a la prevención.

Palabras clave: Inteligencia Artificial. Fisioterapia Preventiva. Calidad de Vida. Promoción de la Salud.

1 INTRODUCTION

The advancement of digital technologies has promoted significant changes in the different fields of health, expanding the possibilities for the prevention, monitoring and follow-up of individuals in distinct clinical conditions. In this context, artificial intelligence (AI) stands out as one of the most relevant innovations of our time, owing to its capacity to process large volumes of data, identify complex patterns and generate information that supports professional decision-making. Its application has been progressively expanding into areas such as diagnosis, health service management, remote monitoring and the development of preventive strategies, contributing to the construction of more efficient and evidence-oriented care models.

Within the field of preventive physiotherapy, the use of artificial intelligence has favoured the incorporation of technological resources aimed at the early identification of risk factors, the continuous monitoring of functionality and the promotion of habits related to health and body movement. Tools such as body sensors, wearable devices, movement analysis systems and machine learning algorithms make it possible to obtain detailed information about the functional performance of individuals, expanding the capacity to develop more personalised preventive interventions. In this way, the integration between artificial intelligence and physiotherapy has contributed to the improvement of quality of life, the reduction of functional limitations and the strengthening of health promotion actions across different population groups.

In view of this scenario, the present study has as its general objective to analyse the application of artificial intelligence in preventive physiotherapy, considering the use of technological strategies aimed at improving quality of life and strengthening health promotion actions in different clinical and preventive contexts. To achieve this purpose, the following specific objectives were established: to investigate the technological strategies based on artificial intelligence applied to preventive physiotherapy, with emphasis on monitoring systems, movement analysis and support for clinical decision-making; to evaluate the contributions of artificial intelligence to the improvement of quality of life of individuals undergoing preventive physiotherapy programmes, considering functional, motor and physical well-being aspects; and to analyse the role of artificial intelligence in health promotion through the development of preventive practices, continuous follow-up and the encouragement of healthy habits across different population groups.

Regarding methodological aspects, the research was developed from a qualitative approach, associated with the literature review research procedure. This choice made it possible to analyse and critically interpret scientific productions related to artificial

intelligence, preventive physiotherapy, quality of life and health promotion, allowing the construction of a discussion grounded in the evidence available in the specialised literature.

To meet the proposed objectives, the article was organised into four main sections. The first corresponds to the Introduction, in which the theme, the contextualisation of the research, the objectives and the methodological aspects are presented. The second section comprises the Methodology, describing the procedures adopted to carry out the study. The third section presents the Theoretical Background, responsible for discussing the main concepts, applications and contributions of artificial intelligence in the context of preventive physiotherapy. Finally, the fourth section gathers the Final Considerations, in which the main results of the investigation and their implications for the field of study are synthesised.

2 METHODOLOGY

The present research was developed from the understanding that artificial intelligence has occupied an increasing space in the processes of prevention, functional monitoring and health promotion within the field of contemporary physiotherapy. The advancement of digital technologies, associated with the need to expand the efficiency of preventive actions, has driven the incorporation of intelligent resources capable of assisting in the early identification of risks, the continuous follow-up of individuals and the adoption of strategies aimed at improving quality of life. In view of this context, investigating the relationships between artificial intelligence and preventive physiotherapy becomes relevant to scientific production, since it makes it possible to gather evidence on technological applications that have been transforming care practices and strengthening approaches centred on health promotion and the maintenance of functionality.

Regarding the methodological approach, this study is characterised as qualitative research. This type of investigation seeks to understand phenomena through the interpretation of meanings, relationships, contexts and theoretical productions, favouring more comprehensive analyses of complex objects of study (Baptista & Campos, 2013; Pereira *et al.*, 2018). In the international scientific scenario, the qualitative approach plays a relevant role by allowing an in-depth understanding of social, technological and scientific phenomena that cannot be fully explained by numerical indicators. In addition, it contributes to the construction of contextualised knowledge and to the critical interpretation of evidence available in the literature, especially in areas marked by constant transformations, such as those related to health and digital technologies (Mattar, 2017).

With respect to the technical procedures, the literature review was employed as an investigative strategy. This procedure consists of the identification, selection, analysis and

interpretation of previously published scientific productions, allowing the researcher to become acquainted with the state of knowledge about a given theme, to identify theoretical convergences and divergences and to construct consistent foundations for the discussion of results (Pereira *et al.*, 2018). In the context of worldwide scientific research, the literature review constitutes one of the most widely used procedures for the systematisation of accumulated knowledge, contributing to the critical organisation of the available evidence and to the development of new scientific reflections (Baptista & Campos, 2013; Mattar, 2017). For the conduct of this study, the literature review was grounded in the analysis of 24 scientific research sources, comprising books and articles published in scientific journals related to artificial intelligence, preventive physiotherapy, health promotion and quality of life.

The combination between the qualitative approach and the literature review procedure proved to be adequate to the objectives proposed in this investigation. This methodological choice made it possible to examine systematically the contributions of artificial intelligence to preventive physiotherapy, enabling the critical analysis of different theoretical perspectives and scientific evidence available in the specialised literature. In addition, the articulation between qualitative interpretation and bibliographic survey favoured a comprehensive understanding of the technological applications aimed at health promotion, functional monitoring and the improvement of quality of life, offering consistent bases for the discussion of the theme and for the achievement of the objectives established in this research.

3 THEORETICAL BACKGROUND

The theoretical background was structured into three complementary thematic axes, organised so as to encompass the main aspects related to the application of artificial intelligence in preventive physiotherapy. Initially, topic 3.1 Technological Strategies Based on Artificial Intelligence in Preventive Physiotherapy addresses the technological resources used in physiotherapeutic practice, with emphasis on body sensors, wearable devices, biomechanical analysis software, functional monitoring systems and tools based on machine learning. Subsequently, topic 3.2 Artificial Intelligence, Functionality and Quality of Life in Preventive Physiotherapy Programmes discusses the contributions of these technologies to the improvement of mobility, functionality and physical well-being, considering their influence on the prevention of functional limitations and on the promotion of quality of life. Finally, topic 3.3 Artificial Intelligence and Health Promotion: Preventive Perspectives in Contemporary Physiotherapy examines the role of artificial intelligence in the development of preventive actions, health education, remote monitoring and the encouragement of healthy habits related to body movement and functional health. This thematic organisation allowed for a

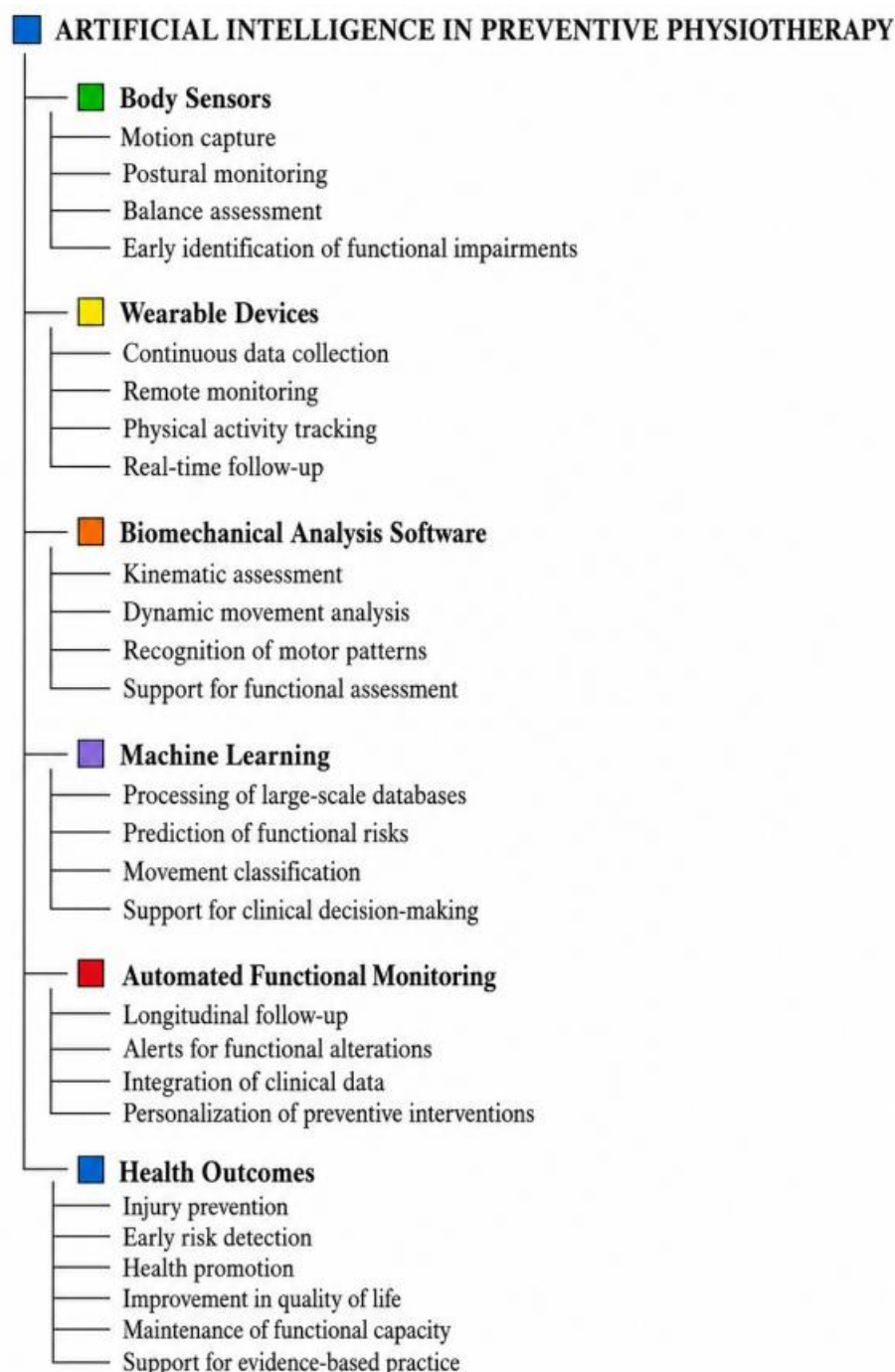
progressive and articulated analysis of the object of study, favouring an understanding of the multiple interfaces between artificial intelligence, preventive physiotherapy, quality of life and health promotion.

3.1 TECHNOLOGICAL STRATEGIES BASED ON ARTIFICIAL INTELLIGENCE IN PREVENTIVE PHYSIOTHERAPY

The incorporation of artificial intelligence (AI) into preventive physiotherapy has promoted significant changes in the way risk factors are identified, monitored and followed up over time. Unlike traditional assessment models, which frequently depend on isolated observations carried out in the clinical environment, intelligent systems allow the continuous collection of information related to the functional performance of individuals. In this context, body sensors, digital platforms and data processing algorithms expand the capacity to track early changes in movement patterns, favouring more timely and individualised preventive interventions. As highlighted by Toledo (2024), the integration between advanced computational resources and physiotherapeutic practice has expanded the possibilities for health monitoring, contributing to actions directed at the maintenance of functionality and quality of life.

Among the main technological strategies used in preventive physiotherapy, wearable devices, also known as wearables, stand out. These devices make it possible to continuously record variables related to mobility, posture, balance, physical activity and biomechanical parameters during the daily activities of individuals. From the analysis of these data, it becomes possible to identify patterns associated with the emergence of musculoskeletal dysfunctions or with the increased risk of injuries. According to Corrêa *et al.* (2023), intelligent devices represent one of the most promising applications of AI in physiotherapy, since they allow remote monitoring and the acquisition of real-time information, favouring preventive strategies grounded in objective evidence.

With the purpose of synthesising the main technological components discussed in this section and their respective contributions to preventive physiotherapy, Figure 1 presents a concept map that relates the strategies based on artificial intelligence, the technological resources employed and the expected results in terms of functional monitoring, prevention of disorders, health promotion and quality of life.

Figure 1**Technological Strategies Based on Artificial Intelligence in Preventive Physiotherapy**

Source: prepared by the author based on Reis *et al.* (2024), Toledo (2024), Mendes Neto *et al.* (2023), Lins *et al.* (2024), Corrêa *et al.* (2023) and Alsobhi *et al.* (2022).

Another widely used resource corresponds to biomechanical analysis software associated with machine learning algorithms. These tools are capable of processing large volumes of data related to the kinematics and dynamics of human movement, identifying patterns that are often imperceptible during conventional assessments. According to Reis *et al.* (2024), machine learning methods have been employed for movement classification, prediction of functional risks and support for clinical decision-making in different contexts of

physiotherapy. This analytical capacity contributes to the early recognition of motor alterations and to the elaboration of preventive programmes more compatible with the individual characteristics of each patient.

The advances observed in the field of digital rehabilitation also demonstrate the growing use of automated functional monitoring systems. These platforms combine sensors, clinical databases and computational models capable of following the evolution of physical performance in a continuous manner. Mendes Neto *et al.* (2023) highlight that artificial intelligence makes it possible to automate assessment and therapeutic follow-up processes, reducing limitations associated with exclusively in-person observation. As a result, professionals are able to access updated information that assists in the identification of functional trends and in the adoption of preventive measures before more significant alterations become established.

The application of these technologies has also been observed in specific populations that require constant monitoring. Lins *et al.* (2024), when discussing the use of AI in paediatric physiotherapy aimed at rare diseases, demonstrate that intelligent systems can contribute to functional assessment, longitudinal follow-up and the personalisation of interventions. Although the focus of the study is directed at the paediatric population, the results highlight possibilities for use in different preventive scenarios, especially in the identification of subtle changes in motor performance and in the elaboration of strategies aimed at the preservation of functionality throughout the life cycle.

Despite the technological advances observed, the implementation of artificial intelligence in preventive physiotherapy still faces challenges related to technological infrastructure, professional training, data security and the integration of these tools into everyday clinical practice. Alsobhi *et al.* (2022) identified that factors such as adequate training of professionals, the quality of the data collected and the acceptance of technologies by users directly influence the adoption of these solutions. Nevertheless, the literature demonstrates that the combination of intelligent sensors, wearable devices, biomechanical analysis software, machine learning and automated monitoring systems constitutes a set of strategies capable of strengthening preventive actions, expanding the efficiency of functional follow-up and favouring initiatives aimed at health promotion and the improvement of quality of life.

3.2 ARTIFICIAL INTELLIGENCE, FUNCTIONALITY AND QUALITY OF LIFE IN PREVENTIVE PHYSIOTHERAPY PROGRAMMES

The growing incorporation of artificial intelligence (AI) into preventive physiotherapy programmes has expanded the possibilities for functional monitoring and individualised follow-up of patients. This transformation occurs mainly through the capacity of intelligent systems to process large volumes of clinical, behavioural and biomechanical data, allowing a more precise understanding of the functional conditions of individuals over time. In this scenario, AI contributes to the early identification of alterations that may compromise mobility and functional independence, favouring more targeted preventive interventions. According to Battistella (2025), the use of technologies based on artificial intelligence represents one of the most relevant advances in contemporary healthcare, especially owing to its contribution to the preservation of functionality and to the promotion of better living conditions.

The relationship between artificial intelligence and quality of life is directly associated with the capacity of these tools to support continuous assessments and more well-grounded clinical decisions. Intelligent systems are able to integrate information from examinations, functional assessments and follow-up records, offering support for the elaboration of conducts compatible with the needs of each individual. Toledo (2024) highlights that the use of AI in physiotherapy favours the optimisation of care processes, expanding the precision of analyses and strengthening strategies aimed at the maintenance of physical and functional health. As a consequence, a greater capacity for the prevention of disorders that could compromise the participation of individuals in their daily activities is observed.

Another relevant aspect refers to the improvement of mobility and the control of functional limitations. Tools based on intelligent algorithms make it possible to identify movement patterns associated with motor deficits, biomechanical compensations and future risks of functional impairment. According to Nunes (2024), the application of artificial intelligence in physiotherapy has contributed to making diagnostic processes more sensitive to the particularities of each patient, favouring earlier interventions. In preventive programmes, this analytical capacity enables the adoption of measures aimed at the preservation of mobility and the reduction of factors that may negatively interfere with functional performance.

The personalisation of interventions constitutes another relevant contribution of AI to preventive physiotherapy programmes. Through the continuous analysis of the data collected during clinical follow-up, algorithms can assist in the adaptation of exercises, therapeutic goals and monitoring strategies according to the functional evolution observed. Ribeiro (2024) emphasises that the use of algorithms aimed at the personalisation of treatments has

favoured approaches more compatible with the individual characteristics of patients, contributing to better results related to functionality and physical well-being. This process makes follow-up more dynamic and allows frequent adjustments based on evidence generated during clinical practice itself.

The prevention of musculoskeletal dysfunctions also benefits from the use of intelligent resources. Movement analysis systems, digital follow-up platforms and clinical support tools are able to identify biomechanical alterations which, when not recognised early, may favour the development of painful conditions, functional limitations and absence from habitual activities. Heck (2025) argues that clinical assistants based on artificial intelligence have been expanding the capacity of physiotherapists to interpret complex information and transform data into support for preventive decisions. In this way, technology comes to act as a complementary resource in the identification of risks and in the planning of strategies aimed at the maintenance of musculoskeletal health.

In order to synthesise the main contributions of artificial intelligence to functionality, mobility, the prevention of musculoskeletal dysfunctions and quality of life in preventive physiotherapy programmes, Table 1 presents an organisation of the benefits observed in the literature and their respective applications in the physiotherapeutic context. It is recommended that the table be inserted after the fourth paragraph of this section, immediately before the discussion on the prevention of musculoskeletal dysfunctions.

Table 1

Contributions of Artificial Intelligence to Functionality and Quality of Life in Preventive Physiotherapy Programmes

Dimension Assessed	Application of Artificial Intelligence	Contributions to Preventive Physiotherapy
Functionality	Continuous monitoring by intelligent systems	Early identification of functional alterations
Mobility	Automated analysis of movement patterns	Improvement of motor performance and prevention of limitations
Clinical Assessment	Integration of clinical and functional data	Greater precision in physiotherapeutic follow-up
Therapeutic Personalisation	Conduct adaptation algorithms	Individualised adjustments of exercises and interventions
Musculoskeletal Prevention	Detection of biomechanical risks	Reduction of the probability of injuries and dysfunctions
Physical Well-being	Longitudinal follow-up of patients	Maintenance of functional independence
Health Promotion	Remote monitoring and clinical decision support	Strengthening of preventive actions

Quality of Life	Earlier and more targeted interventions	Preservation of autonomy and social participation
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Source: prepared by the author based on Battistella (2025), Toledo (2024), Nunes (2024), Ribeiro (2024), Heck (2025) and Fernandes (2025).

Considering the different contributions of artificial intelligence to functionality and quality of life in preventive physiotherapy programmes, it is observed that these technologies exert influence on multiple dimensions of care. In addition to favouring continuous monitoring, the personalisation of interventions and the prevention of dysfunctions, AI expands the capacity for longitudinal follow-up of patients, strengthening actions directed at health promotion. Fernandes (2025) highlights that the integration between clinical knowledge and intelligent tools has significantly modified physiotherapeutic practice, enabling interventions that are more responsive to the needs of individuals. Together, these contributions reinforce the role of artificial intelligence as a resource capable of supporting preventive programmes oriented towards the preservation of functionality, autonomy and quality of life.

3.3 ARTIFICIAL INTELLIGENCE AND HEALTH PROMOTION: PREVENTIVE PERSPECTIVES IN CONTEMPORARY PHYSIOTHERAPY

Health promotion has assumed an increasingly relevant role in the context of contemporary physiotherapy, especially in view of the growth of digital technologies applied to preventive care. In this scenario, artificial intelligence (AI) has been incorporated as a resource capable of expanding the capacity for monitoring, analysing and following up the functional conditions of the population. Its use makes it possible to transform data from different sources into useful information for the planning of preventive actions, favouring interventions more aligned with individual and collective needs. According to Bernasiukpucrs and Sarlet (2024), the expansion of AI in the health sector has promoted important changes in the organisation of care, influencing everything from care processes to strategies aimed at prevention and health promotion.

In the field of physiotherapy, the use of intelligent systems has contributed to the construction of care models more oriented by the anticipation of risks and by the maintenance of functionality. The capacity to process clinical, behavioural and biomechanical information favours the identification of factors associated with the emergence of functional limitations before they produce more significant repercussions on the health of individuals. Corrêa *et al.* (2023) highlight that the integration between physiotherapy and artificial intelligence has been expanding the possibilities for functional follow-up and strengthening practices directed at the prevention of disorders, especially in contexts that require continuous monitoring.

The development of preventive actions based on AI is also associated with the advancement of human movement monitoring technologies. Inertial sensors and machine learning algorithms make it possible to analyse the execution of physiotherapeutic exercises with a high level of detail, offering information that assists both professionals and patients. In this sense, Alfakir *et al.* (2022) demonstrated the feasibility of using sensors associated with machine learning techniques to detect and classify exercises aimed at the treatment of lumbar conditions, highlighting the application of these technologies in remote follow-up and in the promotion of adherence to preventive conducts.

In addition to body sensors, computer vision systems have been expanding the possibilities for functional assessment in non-clinical environments. Arrowsmith *et al.* (2023) demonstrated that postural detection algorithms associated with machine learning are capable of classifying physiotherapeutic exercises using only a camera, reducing barriers related to access and professional follow-up. From the perspective of health promotion, these tools favour the remote supervision of physical activities, allowing faster corrections in the execution of movements and contributing to the adoption of behaviours related to the maintenance of musculoskeletal health.

Health education has also been influenced by the incorporation of artificial intelligence into care processes. Intelligent digital platforms make it possible to provide personalised guidance, the clarification of frequent doubts and the continuous follow-up of the goals established by preventive programmes. Rowe, Nicholls and Shaw (2021) argue that the redistribution of knowledge promoted by intelligent technologies modifies the traditional forms of interaction between professionals and users of health services, creating new possibilities for the dissemination of information related to the prevention of diseases, self-care and the management of one's own health.

Another relevant aspect refers to the training of professionals for the use of these tools in the clinical and preventive context. The adoption of intelligent systems depends not only on technological availability, but also on the knowledge necessary to interpret the data generated and incorporate them adequately into the decision-making process. In this sense, Alsobhi *et al.* (2022) observed that physiotherapists present favourable perceptions regarding the applications of artificial intelligence in health and rehabilitation, although there are still challenges related to professional training and familiarity with the technological resources available.

The advances observed in the automated analysis of movement equally reinforce the contribution of AI to the promotion of healthy habits related to physical activity and body movement. The use of specialised software makes it possible to assess motor patterns,

identify biomechanical compensations and follow the functional evolution of individuals over time. Zsarnoczky-Dulhaz *et al.* (2024) highlight that movement analysis systems based on artificial intelligence present relevant applications both in sport and in physiotherapy, providing information that can guide preventive strategies aimed at the reduction of functional risks and the improvement of physical performance.

In a complementary manner, the literature demonstrates that the combination of artificial intelligence, remote monitoring and data analysis has favoured the construction of more dynamic preventive programmes that are responsive to the needs of the population. Tack (2019) highlights that machine learning applications in musculoskeletal physiotherapy expand the capacity to understand clinical and functional patterns, while Owens *et al.* (2020) emphasise that new technologies have been transforming physiotherapeutic practice through the expansion of the possibilities for the follow-up and assessment of patients. Together, these contributions demonstrate that artificial intelligence has been consolidating itself as a relevant tool for the strengthening of health promotion, preventive education and the adoption of habits favourable to the maintenance of functionality and quality of life.

4 FINAL CONSIDERATIONS

The growing insertion of artificial intelligence into the different levels of health care has expanded the possibilities of action of preventive physiotherapy, especially with respect to functional monitoring, the early identification of risk factors and the development of strategies aimed at health promotion. In this context, the present research demonstrated the relevance of the integration between intelligent technological resources and preventive physiotherapeutic practices, highlighting that the use of tools based on artificial intelligence has been contributing to the construction of more personalised, continuous and data-oriented care models. The importance of this study is associated with the need to understand how these technologies can strengthen preventive actions, favour the maintenance of functionality and contribute to the improvement of quality of life in different population contexts.

In relation to the established objectives, it is verified that all were satisfactorily achieved. It was possible to analyse the application of artificial intelligence in preventive physiotherapy, identifying its main contributions to quality of life and health promotion. The technological strategies used in this context were also investigated, the repercussions of these tools on functional and motor aspects of individuals were evaluated, and the ways in which artificial intelligence has been employed in the development of preventive practices, continuous follow-up and the encouragement of the adoption of healthy habits were examined.

In the development of topic 3.1 Technological Strategies Based on Artificial Intelligence in Preventive Physiotherapy, it was demonstrated that resources such as body sensors, wearable devices, biomechanical analysis software, automated functional monitoring systems and machine learning algorithms have been expanding the capacity for assessment, follow-up and support for clinical decision-making. These technologies allow the acquisition of detailed information about human movement and favour preventive interventions more directed at the individual needs of patients.

As for topic 3.2 Artificial Intelligence, Functionality and Quality of Life in Preventive Physiotherapy Programmes, it was observed that artificial intelligence contributes to the improvement of mobility, to the preservation of functionality and to the reduction of limitations that may compromise the autonomy of individuals. The literature analysed indicated that intelligent systems favour the personalisation of physiotherapeutic interventions, expand the capacity for continuous monitoring and assist in the prevention of musculoskeletal dysfunctions, reflecting positively on quality of life and physical well-being.

In topic 3.3 Artificial Intelligence and Health Promotion: Preventive Perspectives in Contemporary Physiotherapy, it was verified that artificial intelligence has played a relevant role in the strengthening of health promotion actions, especially through health education, remote follow-up and the use of digital tools aimed at the adoption of healthy habits. The studies analysed demonstrated that the integration between intelligent technologies and preventive physiotherapy favours self-care strategies, expands access to specialised guidance and strengthens initiatives aimed at the prevention of disorders related to functional health and body movement.

In view of the results obtained, it is recommended that future research investigate the clinical effectiveness of systems based on artificial intelligence applied to preventive physiotherapy in different populations and care contexts. Studies aimed at evaluating the impact of these technologies on indicators of quality of life, adherence to preventive interventions, functionality and health promotion in the long term are also pertinent. In addition, future investigations may explore aspects related to professional training, ethics in the use of health data and the challenges of implementing these tools in public and private health care systems.

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